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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,995	07/26/2007	Frank-Martin Petrat	296895US0PCT	3290

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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P.  
1940 DUKE STREET  
ALEXANDRIA, VA 22314

EXAMINER
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CREPEAU, JONATHAN

ART UNIT	PAPER NUMBER
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1725

NOTIFICATION DATE	DELIVERY MODE
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04/05/2011

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com  
oblonpat@oblon.com  
jgardner@oblon.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/594,995	<b>Applicant(s)</b> PETRAT ET AL.	
	<b>Examiner</b> Jonathan Crepeau	<b>Art Unit</b> 1725	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 July 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                        |                                                                   |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/1/07 10/8/07</u> .                                          | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### **Claim Rejections - 35 USC § 112**

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 7-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7 recites the preamble "The method of using...", however, this lacks proper antecedent basis and should be "A method...".

Claim 7 (even as amended) provides for the use of an electrode material but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced. See MPEP 2173.05(q) ("A process for using monoclonal antibodies of claim 4 to isolate and purify human fibroblast interferon." was held to be indefinite because it merely recites a use without any active, positive steps delimiting how this use is actually practiced. Ex parte Erlich, 3 USPQ2d 1011 (Bd. Pat. App. & Inter. 1986)).

Claims 7-12 are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a

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process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

### **Claim Rejections - 35 USC § 103**

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-7 and 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al (*Electrochem. and Solid State Letters*, 2003).

Regarding claims 1, 7, and 13, Yang et al. teach an Si/C composite that is useful as an electrode material in a lithium ion battery (see abstract; p. A154, first par.). The composite comprises nanosized silicon having a particle size/diameter of less than 100 nm, fine graphite having a particle size/diameter of 1-2 microns, and pyrolyzed carbon from a precursor (see first par. under "Experimental"). As described on page A154, first full paragraph, an electrode was made which contained 86 wt% of the composite, 6% carbon black, and 8% binder. Taking the composite sample labeled "SGPVC" to be the composite composition (Table 1), the electrode thereby contains 16.9 wt% Si and 25.3% graphite. Regarding claims 9-12, a test cell using the

electrode contained an electrolyte comprising 1M LiPF<sub>6</sub> in ethylene carbonate and dimethyl carbonate.

The reference does not expressly teach that the BET surface area of the silicon is from 5-700 m<sup>2</sup>/g as recited in claim 1, or 6-140 m<sup>2</sup>/g as recited in claim 6.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because it is first noted that the entire composite is disclosed as having a BET surface area of 10.32 m<sup>2</sup>/g or 7.96 m<sup>2</sup>/g (page A155, second column). Further, it is disclosed that the particle size of the composite is 3.6 microns (page A156, first column). Based on these disclosures, the skilled artisan could reasonably conclude that the BET surface area of the Si nanoparticles of the composite would lie within the claimed ranges. It is known that BET surface area generally increases with a smaller particle size, and since the particle size of the composite is 3.6 microns and the BET surface area is 10.32 m<sup>2</sup>/g or 7.96 m<sup>2</sup>/g, a skilled artisan can reasonably conclude that the much smaller (<100 nm) Si particles would have an equally high or higher BET surface area than that disclosed for the composite. Accordingly, the claimed ranges for BET surface area would be rendered obvious.

Regarding claims 2 and 3, although the reference does not expressly teach that the weight amount of Si is 65-86.5% (claim 2) or that the weight amount of graphite is 55-85% (claim 3), such weight amounts would be considered result-effective variables by a skilled artisan. It has been held that the discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. In re Boesch, 205 USPQ 215 (CCPA 1980). In particular, a skilled artisan could increase the amount of Si or graphite, since Si has higher initial

capacity and graphite increases reversible capacity (see Fig. 2; page A155, first full par.).

Accordingly, it would have been within the skill of the art to manipulate the relative amounts of Si and graphite to optimize these characteristics, thereby rendering obvious the claimed ranges.

Regarding claims 4 and 5, although the reference does not expressly teach that the Si is doped with Li, during cycling of the electrode/battery the Si would form an alloy with Li, thereby rendering obvious the claimed doping.

Regarding claims 9-12, although the reference is not anticipatory of a lithium ion battery comprising the recited electrolyte materials, the materials per se are expressly disclosed and as such it would be obvious to use these materials in a lithium ion battery as suggested on page A154, first full paragraph.

5. Claims 1-7 and 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al (Electrochem. and Solid State Letters, 2003) in view of Pridoehl et al (U.S. Patent 7,776,304 or WO 2005/049492, reference is made to '304 patent herein).

Regarding claims 1, 7, and 13, Yang et al. teach an Si/C composite that is useful as an electrode material in a lithium ion battery (see abstract; p. A154, first par.). The composite comprises nanosized silicon having a particle size/diameter of less than 100 nm, fine graphite having a particle size/diameter of 1-2 microns, and pyrolyzed carbon from a precursor (see first par. under "Experimental"). As described on page A154, first full paragraph, an electrode was

made which contained 86 wt% of the composite, 6% carbon black, and 8% binder. Taking the composite sample labeled "SGPVC" to be the composite composition (Table 1), the electrode thereby contains 16.9 wt% Si and 25.3% graphite. Regarding claims 9-12, a test cell using the electrode contained an electrolyte comprising 1M LiPF<sub>6</sub> in ethylene carbonate and dimethyl carbonate.

The reference does not expressly teach that the BET surface area of the silicon is from 5-700 m<sup>2</sup>/g as recited in claim 1, or 6-140 m<sup>2</sup>/g as recited in claim 6.

Pridoehl et al. is directed to nanoscale crystalline silicon powder. The powder has a BET surface area from 20-150 m<sup>2</sup>/g (see abstract). As disclosed in column 2, line 8, the silicon may be doped with up to 53 wt% Li.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the nanoscale silicon powder of Pridoehl et al. in the composite of Yang et al. In the abstract, Pridoehl et al. disclose that the powder can be used to produce electronic components, and in column 1, line 22, it is disclosed that the invention provides for a process of producing the powder that can be prepared on an industrial scale in an economically viable manner. Accordingly, the artisan would be motivated to use the nanoscale silicon powder of Pridoehl et al. in the composite of Yang et al.

Regarding claims 2 and 3, although Yang et al. do not expressly teach that the weight amount of Si is 65-86.5% (claim 2) or that the weight amount of graphite is 55-85% (claim 3), such weight amounts would be considered result-effective variables by a skilled artisan. It has

been held that the discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. In re Boesch, 205 USPQ 215 (CCPA 1980). In particular, a skilled artisan could increase the amount of Si or graphite, since Si has higher initial capacity and graphite increases reversible capacity (see Fig. 2; page A155, first full par.). Accordingly, it would have been within the skill of the art to manipulate the relative amounts of Si and graphite to optimize these characteristics, thereby rendering obvious the claimed ranges.

Regarding claims 9-12, although Yang et al. do not teach a lithium ion battery comprising the recited electrolyte materials, the materials per se are expressly disclosed and as such it would be obvious to use these materials in a lithium ion battery as suggested on page A154, first full paragraph.

Note: the Pridoehl et al. references have a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the references, they constitute prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome



by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. as applied to claims 1-7 and 9-13 above, and further in view of Hamamoto et al (U.S. Pre-Grant Publication No. 2002/0168576).

Yang et al. do not expressly teach that the electrolyte comprises 0.5-10 wt% vinylene carbonate (VC), as recited in claim 8.

Hamamoto et al. is directed to a lithium ion battery comprising a VC additive in an amount of 0.01-10 wt% (see [0037]).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the VC additive of Hamamoto et al. in the electrolyte of Yang et al. In [0034], Hamamoto et al. teach that a battery using an electrolyte having a high purity VC additive has "an extremely superior electric capacity, cycle characteristics, and storage characteristics." Accordingly, the artisan would be motivated to use the VC additive of Hamamoto et al. in the electrolyte of Yang et al.

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. in view of Pridoehl et al. as applied to claims 1-7 and 9-13 above, and further in view of Hamamoto et al.

Yang et al. do not expressly teach that the electrolyte comprises 0.5-10 wt% vinylene carbonate (VC), as recited in claim 8.

Hamamoto et al. is directed to a lithium ion battery comprising a VC additive in an amount of 0.01-10 wt% (see [0037]).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the VC additive of Hamamoto et al. in the electrolyte of Yang et al. In [0034], Hamamoto et al. teach that a battery using an electrolyte having a high purity VC additive has "an extremely superior electric capacity, cycle characteristics, and storage characteristics." Accordingly, the artisan would be motivated to use the VC additive of Hamamoto et al. in the electrolyte of Yang et al.

### **Conclusion**

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley, can be reached at (571) 272-1453. The phone number for the

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organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Jonathan Crepeau/  
Primary Examiner, Art Unit 1725  
March 29, 2011